UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION III
1650 Arch Street
Philadelphia, Pennsylvania 19103-2029

Mr. Larry Lawson, Director
Division of Water Program Coordination
Virginia Department of Environmental Quality
629 Main Street
Richmond, VA 23219

Dear Mr. Lawson:

The Environmental Protection Agency (EPA) Region III is pleased to approve the Total Maximum Daily Loads (TMDLs) for the shellfish harvest use impairments on Lynnhaven, Broad and Linkhorn Bays. The TMDLs were submitted to EPA for review in March 2004. The TMDLs were established and submitted in accordance with Section 303(d)(1)(c) and (2) of the Clean Water Act to address impairments of water quality as identified in Virginia's 1998 Section 303(d) list.

In accordance with Federal regulations at 40 CFR §130.7, a TMDL must comply with the following requirements: (1) designed to attain and maintain the applicable water quality standards, (2) include a total allowable loading and as appropriate, wasteload allocations (WLAs) for point sources and load allocations for nonpoint sources, (3) consider the impacts of background pollutant contributions, (4) take critical stream conditions into account (the conditions when water quality is most likely to be violated), (5) consider seasonal variations, (6) include a margin of safety (which accounts for uncertainties in the relationship between pollutant loads and instream water quality), (7) consider reasonable assurance that the TMDL can be met, and (8) be subject to public participation. The enclosure to this letter describes how the TMDLs for the shellfish harvest use impairments satisfies each of these requirements.

Following the approval of these TMDLs, Virginia shall incorporate the TMDLs into the appropriate Water Quality Management Plans pursuant to 40 CFR § 130.7(d)(2). As you know, all new or revised National Pollutant Discharge Elimination System permits must be consistent with the TMDL WLA pursuant to 40 CFR §122.44 (d)(1)(vii)(B). Please submit all such permits to EPA for review as per EPA's letter dated October 1, 1998.

If you have any questions or comments concerning this letter, please don't hesitate to contact Mr. Peter Gold at (215) 814-5236.

Sincerely,

Jon M. Capacasa, Director
Water Protection Division

Enclosure

Decision Rationale

Total Maximum Daily Load for
the Shellfish Impairments on Lynnhaven, Broad and Linkhorn Bays

I. Introduction

The Clean Water Act (CWA) requires a Total Maximum Daily Load (TMDL) be developed for those water bodies identified as impaired by a state where technology-based and other controls will not provide for attainment of water quality standards. A TMDL is a determination of the amount of a pollutant from point, nonpoint, and natural background sources, including a margin of safety (MOS), that may be discharged to a water quality-limited waterbody.

This document will set forth the Environmental Protection Agency's (EPA's) rationale for approving the TMDLs for the shellfish harvesting (bacteriological) impairments on Lynnhaven, Broad and Likhorn Bays. EPA's rationale is based on the determination that these TMDLs meet the following eight regulatory conditions pursuant to 40 CFR §130.

1) The TMDLs are designed to implement applicable water quality standards.
2) The TMDLs include a total allowable load as well as individual waste load allocations and load allocations.
3) The TMDLs consider the impacts of background pollutant contributions.
4) The TMDLs consider critical environmental conditions.
5) The TMDLs consider seasonal environmental variations.
6) The TMDLs include a margin of safety.
7) There is reasonable assurance that the TMDLs can be met.
8) The TMDLs have been subject to public participation.

II. Background

The Lynnhaven, Broad and Linkhorn Bay Watersheds are located within the City of Virginia Beach in Southeastern Virginia. The watersheds are a combined 40,683 acres in size and are composed of residential (68 percent), park (14 percent), undeveloped (9 percent), agricultural (5 percent) and marsh (4 percent) lands.

In response to Section 303(d) of the CWA, the Virginia Department of Environmental Quality (VADEQ) listed the entire Lynnhaven, Broad and Linkhorn Bays (VAT-C08E) as impaired on Virginia's 1998 Section 303(d) list for being unable to attain the production of edible and marketable natural resources due to elevated levels of fecal coliform bacteria. The criteria are in place to protect the public from health affects associated with the consumption bacteriologically contaminated shellfish.

The impairment is based on restrictions placed upon the harvesting of shellfish from these waters. The restrictions which are issued by the Virginia Department of Health's Division of Shellfish Sanitation (DSS) are based on monthly monitoring data. DSS collects monthly fecal coliform bacteria samples from each of its sampling stations in the Bays. DSS calculates a geometric mean and 90th percentile concentration values based on the most recent 30-months of sampling data. The criteria calls for a 30-month geometric mean concentration of less than 14 most probable number (mpn)/100ml and a 90th percentile, based on the same 30-months of data below 49 mpn/100ml. The criteria is identical to criteria developed under the National Shellfish Sanitation Program which is regulated by the U.S. Food and Drug Administration. Most of the stations were listed for failing to attain the 90th percentile criteria. Table 1 identifies the TMDL loadings for Lynnhaven, Broad and Linkhorn Bays.

Table 1 - TMDL Loadings

Water	TMDL (cfu/yr)	WLA (cfu/yr)	LA(cfu/yr)	MOS
Lynnhaven Bay	2.65E+12	9.01E+11	1.75E+12	Implicit
Broad and Linkhorn Bay	2.75E+11	9.35E+10	1.82E+11	Implicit

III. Discussion of Regulatory Conditions

EPA finds that Virginia has provided sufficient information to meet all of the eight basic regulatory requirements for establishing shellfish harvesting use impairment TMDLs for Lynnhaven, Broad and Linkhorn Bays. EPA is therefore approving these TMDLs. EPA's approval is outlined according to the regulatory requirements listed below.

1) The TMDLs are designed to meet the applicable water quality standards.

Lynnhaven, Broad, and Linkhorn Bays were listed as impaired due restrictions placed on the harvesting of shellfish as a result of excessive concentrations of fecal coliform bacteria in the water column. Virginia developed these TMDLs to insure that they would meet the applicable criteria of a 30-month geometric mean of 14 mpn/100ml and a 90th percentile of 49 mpn/100ml. Most (32 of the 49) of the DSS monitoring stations within the Bays were unable to attain the 90th percentile criteria. The TMDLs were modeled by the Commonwealth using a volumetric load approach.

The Commonwealth collected 12-months (September 2001 through August 2002) of bacterial source tracking (BST) and fecal coliform data from the impaired areas. The BST data was collected from 11 of the 42 monitoring stations to determine the sources of fecal coliform to the watershed. The sources were broken down into five categories human, pets, livestock, wildlife, and avian (wildlife). An average percent loading per source category was obtained by summing the monthly percent concentrations and dividing that summation by 12. The Commonwealth than determined the 30-month geometric mean and 90th percentile concentration values for each impaired segment using data from February 2000 through August 2002, which

coincides with the BST samples. The existing load was determined for each criteria by multiplying the existing 90th percentile and geometric mean concentrations by the water volume. The allowable load was determined by multiplying the criteria by the volume of the Bay. The required reductions were determined by subtracting the allowable load from the existing load. The 90th percentile concentration was the more stringent criteria and was used for all the TMDLs. All 20 monitoring stations on Lynnhaven Bay failed to attain this criteria. Twelve of the 21 stations on Broad and Linkhorn Bays failed this criteria as well.

2) The TMDLs include a total allowable load as well as individual waste load allocations (WLAs)and load allocations.

Total Allowable Loads

Virginia indicates that the total allowable loading is the loading derived by multiplying the more stringent criteria by the volume of water. The total allowable loading contains the sum of the loads allocated to land based precipitation driven nonpoint source areas (developed and agricultural land segments) and point sources. Activities that increase the levels of fecal coliform to the land surface or their availability to runoff are considered flux sources. The actual value for total loading can be found in Table 1 of this document. The total allowable load is calculated on an annual basis.

Waste Load Allocations

There are point source contributions of bacteria to the Lynnhaven, Broad and Linkhorn Bays. There are several stormwater discharges that discharge to the Bays and are controlled under a stormwater permit issued to Virginia Beach. Table 2 lists the WLA for this permit.

EPA regulations require that an approvable TMDL include individual WLAs for each point source. According to 40 CFR 122.44(d)(1)(vii)(B), "Effluent limits developed to protect a narrative water quality criterion, a numeric water quality criterion, or both, are consistent with assumptions and requirements of any available WLA for the discharge prepared by the state and approved by EPA pursuant to 40 CFR 130.7." Furthermore, EPA has authority to object to the issuance of any National Pollutant Discharge Elimination System (NPDES) permit that is inconsistent with the WLAs established for that point source.

Table 2 - WLA for Lynnhaven, Broad and Linkhorn Bays

Facility	Permit Number	WLA (cfu/yr)
City of Virginia Beach	VA0088676	9.94E+11

Load Allocations

According to Federal regulations at 40 CFR 130.2(g), load allocations (LAs) are best estimates of the loading, which may range from reasonably accurate estimates to gross

allotments, depending on the availability of data and appropriate techniques for predicting loading. Wherever possible, natural and nonpoint source loads should be distinguished.

Load allocations were developed for each of the five fecal coliform source categories (avian (wildlife), human, pets, livestock, and wildlife). The loadings were not developed on a landuses basis. The implementation techniques needed to insure compliance with the TMDL will be applied to the landuse for the applicable sources. All of the TMDLs required reductions in loadings from humans. Table 3 documents the LAs for each source category of fecal coliform bacteria. No reductions were required from wildlife or avian sources in the Broad and Linkhorn Bays TMDL. All sources were required to reduce their loadings in the Lynnhaven Bay TMDL.

Table 3- Load Allocations by Source

Segment/ Watershed	Avian (cfu/yr)	Human (cfu/yr)	Pets (cfu/yr)	Livestock (cfu/yr)	Wildlife (cfu/yr)
Lynnhaven Bay	1.67E+11	0.00	0.00	0.00	8.16E+11
Broad and Linkhorn Bays	6.19E+10	4.07E+10	4.72E+10	5.51E+10	5.51E+10

3) The TMDL considers the impacts of background pollution.

Background pollutant contributions were considered in the TMDL development process by quantifying the fecal coliform loads from wildlife sources through the use of BST data.

4) The TMDL considers critical environmental conditions.

According to the EPA regulation 40 CFR 130.7 (c)(1), TMDLs are required to take into account critical conditions for stream flow, loading, and water quality parameters. The intent of this requirement is to ensure that the water quality of Lynnhaven, Broad and Linkhorn Bays is protected during times when it is most vulnerable.

Critical conditions are important because they describe the factors that combine to cause a violation of water quality standards and will help in identifying the actions that may have to be undertaken to meet water quality standards[1]. Critical conditions are a combination of environmental factors (e.g., flow, temperature, etc.), which have an acceptably low frequency of occurrence. In specifying critical conditions in the waterbody, an attempt is made to use a reasonable "worst-case" scenario condition. For example, stream analysis often uses a low-flow (7Q10) design condition because the ability of the waterbody to assimilate pollutants without exhibiting adverse impacts is at a minimum. These critical conditions ensure that water quality

[1]EPA memorandum regarding EPA Actions to Support High Quality TMDLs from Robert H. Wayland III, Director, Office of Wetlands, Oceans, and Watersheds to the Regional Management Division Directors, August 9, 1999.

standards will be met for other than worst case scenarios. By quantifying the TMDL load reductions to the more stringent criteria and evaluating a 30-month data period, the TMDLs are insuring that the standards are maintained during critical conditions.

5) The TMDLs consider seasonal environmental variations.

Seasonal variations involve changes in stream flow as a result of hydrologic and climatological patterns. In the continental United States, seasonally high flows normally occur in early spring from snow melt and spring rain, while seasonally low flows typically occur during the warmer summer and early fall drought periods. Source loadings were investigated on a monthly basis to determine if seasonality existed, based on the results it was determined that there was minimal seasonal impacts to loading and the source loads were averaged on an annual basis.

6) The TMDLs include a margin of safety.

This requirement is intended to add a level of safety to the modeling process to account for any uncertainty. The MOS may be implicit, built into the modeling process by using conservative modeling assumptions, or explicit, taken as a percentage of the WLA, LA, or TMDL. Virginia included an implicit MOS in the TMDLs for the Lynnhaven, Broad and Linkhorn Bay TMDLs by not accounting for flushing of the tidal system and by targeting the highest level at which the ambient levels exceed the water quality standard.

7) There is a reasonable assurance that the TMDL can be met.

EPA requires that there be a reasonable assurance that the TMDL can be implemented. WLAs will be implemented through the NPDES permit process. According to 40 CFR 122.44(d)(1)(vii)(B), the effluent limitations for an NPDES permit must be consistent with the assumptions and requirements of any available WLA for the discharge prepared by the state and approved by EPA. Furthermore, EPA has authority to object to issuance of an NPDES permit that is inconsistent with WLAs established for that point source.

Nonpoint source controls to achieve LAs can be implemented through a number of existing programs such as Section 319 of the CWA, commonly referred to as the Nonpoint Source Program.

8) The TMDLs have been subject to public participation.

A public meeting was held on December 2, 2003 at Princess Anne High School. The notice for the meeting was printed in the Virginia Register on November 17, 2003. The TMDLs were subject to a 30-day public comment period. VADEQ responded to all comments on the TMDLs.